

- (1) The regeneration of a limb by a newt after amputation ; the regenerative process, beginning as proliferation of a mass of cells on the cut surface, which then become differentiated and organized to restore exactly the part cut off, no matter at what point the cut has been made, My point is here that the organism which effects the restitution is no longer whole ; and we do not know how much of it must remain in order that regeneration may take place. The embryo of the frog can develop after removal of the brain and spinal cord.
- (2) The complexly organized protozoan, Stentor, which has definite shape and organs, may be cut into many parts; and even a very small part (one hundredth of the whole, it is said), so long as it contains a fragment of the nucleus, will regenerate the whole. Here, then, the part, and a very small part, remakes the whole.
- (3) The same is true in less degree in the case of the more highly differentiated and organized *Clavellina*. Any small piece cut from its highly specialized gill-structure can regenerate the whole ; and—more striking, perhaps—if the whole be cut into two halves transversely, the posterior half will regenerate the anterior end, and the anterior half the posterior end. Here of two halves each makes its own whole.
- (4) The bony skeleton may be excised from a newt's limb, with the result that a new set of bones is formed to take their place; demonstrating, in the adult creature, the fresh specialization of tissue out of cells of quite other functions.
- (5) The phenomena of metamorphosis. The

specialized
tissues of the caterpillar in the cocoon-
stage become
broken down into mere non-living masses of
protein with
small discs of living cells of unspecialized
type scattered